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ON A COLLECTION OF BATRACHIA AND REPTILIA FROM THE
ISLAND OF HAINAN.

BY E. D. COPE.

The collection on which the following notes are based was made by the Rev. Francis Gilman, who sent them to Prof. Chas. S. Dolley. Prof. Dolley placed them in my hands for identification and description.

Hyla arborea var.

This form agrees in structural features with the true *Hyla arborea* of Europe, but differs in coloration, not only from this but from the two subspecies which are known from Eastern Asia (*H. a. chinensis*, and *H. a. japonica*).

The extended hind limb marks a point between the eye and the nostril with the heel. The vomerine teeth are between the internal nostrils, but the posterior borders of the fasciculi are behind a line which connects their posterior borders. The diameter of the tympanum is about half that of the eye; and the interorbital width is greater than that of an eyelid. The length of the head to a line connecting the posterior borders of the tympana, enters the total length 3.2 times. The fingers are slightly webbed, and the toes are about two-thirds webbed. There is a heavy glandular fold from the orbit to the shoulder.

The color is uniform green above, and uniform pale (perhaps yellowish) below. There are no spots of any kind anywhere. A light brown band extends from the eye through the tympanum and disappears about the shoulder. It has neither dark nor pale borders, and is hence very indistinct. A similar band extends from the eye to the nostril. Upper lip not pale bordered nor spotted. Total length, 40 mm.; do. of hind leg from groin, 59 mm.; of hind foot, 27 mm.

Holarchus dolleyanus sp. nov. Plate X, fig. 1.

Scales in seventeen rows. Superior labials eight, all higher than long, the fourth and fifth entering the orbit, the sixth in contact with the inferior postocular only, the seventh in contact with the lower postocular, and more extensively with the parietal. Loreal trape-

zoid; oculars 1-2; temporals 0-2. Internasal mutual contact short; parietals short, wide, truncate posteriorly, bounding both postoculars posteriorly. Pregenials bounded by four labials, a little longer than postgenials. Gastrosteges, 164, obtusely angulated; anal entire; urosteges, 36.

Color above yellowish-brown; below brownish-yellow. No marks on the head; on the superior surface of the body there are indistinct cross bars, which consist of the dark edges of scales, at intervals of two and three scales; they are not continued on the tail. Total length, 400 mm.; of tail, 58 mm.

This species probably resembles the *H. swinhonis* Gthr. (Rept. Brit. India, p. 215, Pl. XX, fig. E.); but it differs materially in having but one preocular; in the absence of an anterior temporal; in the contact of the anterior genial with four labials, and in the longer postgenial. The color above is pale brown, not olive.

The hemipenis of this species is smooth, and without spines, flounces, or ruches; agreeing with that of the *H. ancorus*, as figured by me in the "American Naturalist," 1894, Plate XXVII, fig. 4. These characters refer the genus to the Calamariinæ, with *Oligodon*, etc. (See "American Naturalist," 1893, p. 480.) A character of subordinate value seen in the hemipenis of *H. ancorus*, which is not present in *H. dolleyanus*, is a shallow pocket on each side of the sulcus spermaticus.

There is a rudimental right lung 5 mm. in length, communicating with the trachea by foramen. No tracheal lung.

This species is dedicated to my friend, the distinguished zoologist, Dr. Chas. S. Dolley.

***Pareas mœllendorffi* Böttger.**

A single male specimen gives me an opportunity of determining the position of this curious genus. With some external resemblance to the American *Leptognathus*, it combines not dissimilar dentition and squamation; it is to be presumed that the habits are not dissimilar. Examination of the hemipenis shows, however, that it is really related to the Calamariinæ, and to *Simotes*. This organ is without spines or ruches, and has only flat obtuse papillæ on the middle third of its length, the distal portion being smooth, with a few feeble papillæ at the apex. It is deeply bifurcate, the basal portion being quite short. At the summit of the middle papillöse

section is an oblique membranous flounce with a lobate margin. No tracheal lung; and I could find no right lung.

***Amphiesma stolatum* L.**

In this species the hemipenis displays the usual natricine characters of a basal hook, and small spines reaching to the apex, without ruches or flounces. The spines are, however, coarser than in most other species. The organ, moreover, is undivided, and with undivided sulcus, and as *A. stolatum* is the type of the genus, the latter must be defined accordingly, and not as divided, as I inferred from an examination of allied species which have been referred to it by authors.¹ These supposed species of *Amphiesma* which I have examined, which have divided hemipenis and diacranterian dentition, are also characterized by the presence of fossæ of the hemipenis from the center of each of which a spinule issues. These are the *Amph. tigrinum* and *A. ceylonense*, and they belong to my genus *Bothrodytes*, which name should take the place of *Amphiesma* in my original Prodromus, l. c. The genera of Natricinæ with basal hooks will then be as follows :—

I. Fusiform types; hemipenis and sulcus undivided.

Hemipenis simple; anal divided;

One internasal, scales keeled; *Haldea* B. & G.

Two internasals, scales keeled; *Amphiardis* Cope.

Two internasals, scales smooth; *Virginia* B. & G.

Hemipenis with two apical papillæ; anal entire.

Two internasals; scales keeled; *Tropidoclonium* Cope.

II. Colubriiform types.

a. Hemipenis undivided.

b. Dentition syncranterian or isodont.

Anal plate entire; a loreal; *Eutænia* B. & G.

Anal plate divided; no loreal; *Storeria* B. & G.

Anal plate divided; a loreal; *Natrix* Laur.

Anal plate divided; a loreal; one prefrontal; *Trimerodytes* Cope

bb. Dentition diacranterian.

Scales keeled; two internasals; *Amphiesma* D. & B.

Scales smooth; one internasal; *Liodytes* Cope.

aa. Hemipenis divided.

b. Dentition syncranterian.

¹ American Naturalist, 1893, p. 483.

Hemipenis with two apical papillæ;	<i>Ceratophallus</i> Cope.
Hemipenis without papilla;	<i>Diplophallus</i> Cope.
bb. Dentition diacranterian.	
Hemipenis without papilla;	<i>Bothrodytes</i> Cope.

Trimerodytes balteatus gen. et sp. nov. Plate X, fig. 2.

Char. gen.—Characters of *Natrix*, but the prefrontals fused. The dentition is syncranterian or coryphodont. Hemipenis undivided, sulcus simple.

The single species on which this genus is proposed is represented by an individual which, while apparently not very young, is at the same time not fully grown. As a consequence the spinules of the hemipenis are not ossified, appearing as fine flexible papillæ. This is the condition normal to immature snakes, as I have observed in the genera *Drymobius*, *Bascanium*, etc.

Char. specif.—Scales in nineteen rows, smooth, except on the tail, where all except the lateral rows are feebly keeled, and for a short distance in front of the vent, where about three dorsal rows are also weakly keeled. Each internasal longer than wide. Frontal rather wide, with straight borders, the anterior a little longer than the lateral. Parietal moderately elongate, angulate posteriorly, and embracing only the superior postocular. Loreal higher than long; oculars 1-2 or 3; temporals 1-2. Superior labials nine. These are differently distributed on opposite sides, so that the numbers may be in other specimens, eight or ten. One labial forming most of inferior border of orbit, which may be the fourth or fifth; the angle of the succeeding labial enters the orbit. On one side two plates represent the single last upper labial on the other. Inferior labials nine; pregenials shorter than postgenials, and bounded by six labials. Gastrosteges, 202; anal, 1-1; urosteges, 84.

Color black, crossed by white or pale yellow rings. These have a width of half of a scale on the middle dorsal region, and widen downward, covering two or three gastrosteges. They are frequently broken on the middle line, the halves alternating, both on the back and belly. The labials and oculars have yellow centers, and there is a yellow line from near the angle of the mouth to near the middle line above. A pair of yellow spots are on each side of the common suture of the parietal plates.

Total length, 377 mm.; tail, 80 mm.

Bothrops erythrorus Cantor.

Before leaving the Ophidia I add some remarks on the penial characters of some species which do not enter the present collection, and which I have recently examined.

The genus *Anomalodon* Jan (*Lioheterodon* Boulenger, from a nom. nud. of Dum. & Bibr.) has the hemipenis deeply divided and covered with minute spines, without large hooks at the base. It is to be referred to the Pseudaspidinae of my Prodrömus, approaching the genus *Pseudaspis* m. of S. Africa. Boulenger has shown that it has the natricine hypapophyses.

The Australian *Dipsas fusca* Gray, differs from the genus *Dipsas* in the absence of spines from the hemipenis; the characters are otherwise as in *Dipsas*. I propose to name this new genus *Liophallus*, with *L. fuscus* as type.

I propose to separate *Drymobius percarinatus* Cope from *Drymobius* as the type of a distinct genus under the name of *Cacocalyx*. It differs from that genus in the structure of the terminal half of the hemipenis. Instead of the usual papillose calyces, there are rows of spines on longitudinal folds, and the apex is covered with a few large, shallow, smooth-edged calyces, which are separated from the spinous portion by a continuous transverse fold, *i. e.*, the apex is capitate. I have compared this organ with the corresponding ones of *Drymobius margaritiferus* (type); *D. pantherinus*; *D. reticulatus*; *D. boddaertii*, and *D. pulcherrimus*, where they are essentially alike. The genus *Cacocalyx* is quite different from any other form of Colubrinae.

The *Cyclophis major* Gunth., presents the penial characters of the Colubrinae, but has an especial peculiarity not shared by any other species with which I am acquainted. In the proximal internal wall of each calyx is a transverse comb of a few spines. These do not graduate into the spines of the middle of the hemipenis, which are well developed. The borders of the calyces are serrate to papillose. As this type is clearly not referable to any known genus, I propose to distinguish it by the name of *Entechinus*. It is evidently not very nearly related to *Liopeltis* and *Cyclophis* of N. America.

The genus *Macroprotodon* (Guich.) has the apical region of the hemipenis calyculate, and the papillae at the angles of the calyces are spinous (*i. e.*, ossified) to near the tip. There are numerous

spines below the calyces. Hemipenis simple. The genus belongs to the Dipsadinæ.

Psammodynastes has a divided penis which is spinous to the tip and not calyculate. The spines are arranged in the branches in oblique series, pinnate to the sulcus. Not knowing the structure in *Psammophis* I cannot determine the affinity of the genus.

In *Osceola (elapsoides)* the penial characters are like those of *Ophibolus doliatus*; i. e., the calyces are numerous and fringed. In *Ophibolus* they are very few and have entire borders. I therefore place *O. doliatus* in *Osceola*. All the species of *Ophibolus* agree in the character assigned.

The *Dromicus flavilatus* Cope, of the S. E. coast regions of the United States, has the penial structure of *Rhadinaea* Cope, and does not belong to *Dromicus*. The organ is undivided, and the calyculate region is capitate. We have here a case parallel to the genus *Liodytes*, of which the type species was supposed to be a *Helicops*. Both these Floridan forms turn out to be allies of types found on the North American continent.

Causus Licht. has the character of other *Solenoglypha*, i. e., coarsely spinous at the middle, and calyculate above, and deeply bifurcate. In *C. rhombeatus*, the only species examined, there is at the middle of each branch a longitudinal fissure-like interruption of the calyculate structure which contains feeble laminæ on its sides and fundus. The calyces are papillose.

As regards the structure of the lungs, I have to add observations on two species not previously examined. In *Anomalodon madagascariensis* there is no tracheal lung nor auricle of the large left lung. The rudimental right lung measures about 6 mm. In *Psammophis irregularis* the structure is similar in the points mentioned, except that I could not discover a rudimental right lung.

Calotes versicolor Daud.